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Chemical Hygiene Plan

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Table of Contents

1. General (back to top)

A. Purpose and Scope (back to top)

This Chemical Hygiene Plan (CHP) is intended to ensure that Clayton State University (CSU) is in compliance with the Board of Regents (BOR), the Georgia State Law *"Public Employee Hazardous Chemical Protection and Right To Know Act of 1988"*, Official Code of Georgia Annotated (O.C.G.A) Chapter 45-22-1, and the Georgia Department of Labor (GDOL) Safety Engineering "*Public Employee Hazardous Chemical Protection and Right to Know Rules*" Chapter 300-3-19. This Plan is intended to protect faculty, staff and students, as appropriate, from harm due to exposure to hazardous chemicals while they are working in CSU laboratories.

This Plan contains Standard Operating Procedures (SOP), standard laboratory safe handling and storage requirements, circumstances that require prior approval, provisions for work with particularly hazardous substances, emergency/medical attention and surveillance, standard laboratory facility requirements and standard repair/close-out/decommissioning procedures. Appendix A contains a list of acronyms used throughout this document.

It is the responsibility of CSU and its employees to be well informed regarding hazardous chemicals used in the laboratories as well as the risks associated with these chemicals. Therefore, this document serves as the written guide for CSU University-wide compliance to the Laboratory Standard and the CHP requirements contained within and will serve as a broad–based chemical hygiene plan for all University owned and operated laboratories. All laboratories at CSU engaged in the use of hazardous chemicals (as defined by this document) are required to comply with this Plan. The Occupational Safety and Health Administration (OSHA) List of Toxic and Hazardous Substances (29 CFR 1910 Subpart Z) for air contaminants (Tables Z-1 and Z-2) and mineral dusts (Table Z-3) is included in this document as Appendix B.

The primary objective of this document is to provide a general guide for handling hazardous chemicals in the laboratories; and also to establish basic safety principles for laboratory procedures, equipment and work practices that are capable of protecting employees from both physical and health hazards that may be associated with the use of hazardous chemicals in the laboratory.

This document is intended to highlight only those measures necessary for achieving a safe and healthy work environment. Where the 'scope of hazards' are not adequately addressed by this general document, specific SOPs will be developed. This document hereafter shall be known as the Clayton State University Chemical Hygiene Plan (CSU-CHP).

B. Definitions (back to top)

Chemical Hygiene Plan*:* A written program that sets forth procedures, equipment, personal protective equipment (PPE) and work practices designed to protect employees from health hazards associated with chemicals used in the work place.

Employee: For CSU's purposes, an employee shall be defined as any individual employed in a lab workplace, whether he/she is paid or volunteer, who may be exposed to hazardous chemicals in the completion of his/her assignments. Student assistants and directed study students are considered employees; however, students taking lab classes are not.

Hazardous Chemicals: Any chemical, chemical compound or mixture of compounds which presents a physical and/or health hazard.

Health Hazard Chemicals: A chemical for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. These include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucus membranes.

Laboratory: A facility where the 'laboratory use of hazardous chemicals' occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory –Type Hood (fume hood): A 5-sided enclosure with a movable sash, constructed and maintained to draw air from the lab and to prevent or minimize the escape of air contaminates into the lab. It allows for chemical manipulations within the enclosure with only insertion of the employee's hands and arms into the front.

Physical Hazard Chemical: A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, an explosive flammable, an organic peroxide, an oxidizer, an explosive, a pyrophoric, an unstable reactive or a water reactive.

Primary Barrier: Safety equipment, such as biosafety cabinets, designed to remove or minimize exposure to hazardous biological materials.

Protective Lab Practice and Equipment: Those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Secondary Barrier: Safety equipment, such as autoclaves, designed to protect the surrounding community from exposure to hazardous biological materials.

C. Designation of Responsibilities (back to top)

The Department of Environmental Health and Safety (EH&S): Shall be responsible for assuring University compliance with state and federal standards. EH&S shall also be responsible for oversight of the CSU Chemical Hygiene Program.

The Natural Sciences Department's Laboratory Manager will serve as the Chemical Hygiene Officer (CHO). It will be the responsibility of the CHO and/or EH&S to do the following:

- Monitor purchases, use and disposal of chemicals,
- Conduct routine laboratory inspections,
- Provide laboratory safety training to faculty, lab supervisors, coordinators and lab assistants,
- Maintain Safety Data Sheets (SDS) or Material Safety Data Sheets (MSDS) for all chemicals used in the labs,
- Revise and update the CHP based on changes in lab protocols, chemicals used, and/or federal and state regulations,

- Be responsible for routine inspections of safety and emergency equipment, e.g. eyewash stations, fume hoods, safety showers, etc.

The CHO, along with EH&S can assign areas of responsibility to units, project directors, lab supervisors and other individuals as needed, to implement and carry out the provisions of the CHP.

The CHO and EH&S will serve as the on-campus authorities and sources of information for the CSU-CHP.

Departments in the College of Arts and Sciences: The Dean of the College of Arts and Sciences and the Chair of the Department of Natural Sciences will provide continuing support for the school's strict adherence to this CHP. The Department chair will be responsible for maintaining a departmental safety system including identification of a Safety Officer.

The Natural Science Safety Committee and Lab Manager/CHO: These individuals shall ultimately be responsible for implementing the CHP and supporting the efforts of the Natural Science Faculty to do so. It will be the responsibility of the Lab Manager/CHO and Natural Science Faculty to do the following:

- Receiving training to ensure compliance with the CHP,
- Ensure all lab employees under his/her supervision receive general chemical training,
- Provide all employees under his/her supervision with site specific training and provide documentation of such training,
- Ensure employees know and follow the procedures outlined in this Plan,
- Develop good chemical hygiene habits,
- Recognize unsafe acts and unsafe conditions in the laboratory,
- Determine the required level of protection when working with chemicals and performing experiments,
- Ensure the availability of PPE, and MSDSs or SDSs,
- Routinely inspect labs for hazards and cleanliness,
- Recognize the hazards associated with and proper storage of all chemicals (old and new),
- Determine if facilities are adequate for experiments that are being conducted.

Lab Technicians for Biology and Chemistry: These individuals shall be responsible for the following:

- Receiving training to ensure compliance with the CHP,
- Ensure laboratory assistants know and follow the procedures outlined in this Plan,
- Being aware of the hazards associated with the chemicals and equipment in use,
- Routinely inspect labs for hazards and cleanliness,
- Keeping the laboratory, lab glassware, and equipment in a clean and orderly condition,
- Recognize the hazards associated with and proper storage of all chemicals (old and new).

Lab Assistants: These individuals shall be responsible for the following**:**

- Receiving training to ensure compliance with the CHP,
- Developing good chemical hygiene habits,
- Being aware of the hazards associated with the chemicals and equipment in use,

- Keeping the laboratory, lab glassware, and equipment in a clean and orderly condition,
- Reporting job-related illnesses and injuries to the supervising Lab Technician and Lab Manager/CHO.

D. Employee Rights (back to top)

It is the employee's right to receive information about the known physical and health hazards of the hazardous chemicals in their specific work areas and to receive adequate training to work safely with these chemicals.

E. Plan Availability (back to top)

The CSU-CHP must be readily available to employees through their supervisors or departmental offices.

Additional copies of this document are available from the EH&S and Natural Sciences Departments and the EH&S website at www.clayton.edu/ehs.

F. Annual Review (back to top)

The CSU-CHP will be reviewed annually from its effective date by the CHO and the EH&S Department.

G. Employee Information and Training (back to top)

Employees will have access to information and training to ensure that they are aware of the chemicals present in their work areas. Right-To-Know Chemical-Specific (RTK-CS) training will be given to each new employee at the time of initial assignment to a work area where hazardous chemicals are present and prior to the introduction of a new chemical or hazard in the workplace. RTK-CS Training complies with the State of Georgia's Public *Employees Hazardous Chemical Protection and Right to Know Act of 1988 (O.C.G.A., Title 45, Chapter 22).*

General training will be provided by the Natural Sciences Department and may take the form of individual instruction, group seminars, handout materials, audiovisual presentations or any combination of the above. Chemical-Specific training for the employee's specific work area will be provided by the Laboratory Manager, Principal Investigator (PI), or an appropriate designee.

Training related to general awareness of chemical safety and chemical-specific training as well as incident/accident records will be documented and maintained by the Natural Sciences Lab Manager/CHO.

In addition to the above training, laboratory employees will be trained in the use of portable fire extinguishers. It is also recommended that the Lab Manager/CHO, Lab Technicians and PIs be trained in First Aid/CPR.

The following resources are available from the Natural Sciences Department Lab Manager/CHO:

- The OSHA Lab Standard 29 CFR 1910.1450
- ANSI/AIHA Z9.5-2003 (American National Standards for Laboratory Ventilation)
- BSR/ASHRAE 110-1995R (Method of Testing Performance of Laboratory Fume Hoods)
- The CSU-CHP
- Electronic MSDS or SDS collection

For more training resources visit the BOR EHS Website.

H. Record Keeping (back to top)

The amount of time which records must be retained is not specified in the Laboratory Standard. It is recommended by this document that all such records be retained for 7 years after an employee leaves a position.

Training records will be kept by the Laboratory Manager. Each record will consist of a sign-in sheet and training agenda or documentation of online course completion.

Fume hood and biosafety cabinet (BSC) performance evaluations and repair records will be kept by the Lab Manager/CHO. These records will document the routine performance testing and maintenance of this equipment. Certification stickers will be affixed to each fume hood and BSC that is operating properly. Recent testing records for eyewash stations will be posted near each station. Older records will be retained by the Lab Manager/CHO. These records will document that the safety equipment is kept in proper working order.

Accident/Incident reports will be kept by the Lab Manager/CHO with a copy going to EH&S. If a Workers Compensation Claim is filed, a copy of the Accident/Incident report will be sent to the Personnel Department. Medical evaluations, physician's opinion reports and Workers Compensation claims will be kept by the Human Resources Department. See Appendix C for the Supervisor's Accident/Incident Report Form.

2. Standard Operating Procedures (back to top)

SOPs in the Natural Science Department's teaching labs are defined by the details contained in the Laboratory Manuals for each course. Relevant experimental procedures and safety and health considerations for working with hazardous chemicals in a laboratory setting are specified in those documents. Where the scope of hazardous conditions is not adequately addressed in the Laboratory Manuals or for research studies outside the scope of a teaching lab, PIs in conjunction with the Lab Manager/CHO will develop written SOPs specific to those labs or studies. General SOPs for safety, hygiene, housekeeping, chemical handling, storage, and transportation, and storage and disposal of hazardous waste are covered in this document and specify minimum regulations and recommendations.

A. General Safety (back to top)

CSU employees working in laboratories and lab areas will understand and observe the following general rules:

- Know the hazards, precautions, and procedures to use when working with a particular chemical. Carefully read the label before using an unknown chemical. Whenever appropriate, review the SDS or MSDS for special handling instructions.
- Be alert to unsafe acts and unsafe conditions that may develop in the laboratory. Instruct and encourage safe work practices.
- Never leave students unsupervised during labs or laboratory work. Students are not accustomed to recognizing unsafe acts and conditions, nor are they sure of safe lab practices.

- Be familiar with the location of emergency equipment - fire alarms, fire extinguishers, and fire blankets, emergency eye wash stations and showers, chemical spill and first aid kits. Know the appropriate emergency response procedures.
- Avoid distracting or startling other workers when they are handling hazardous chemicals.
- Horse play is not allowed in lab areas or laboratories.
- Use equipment and hazardous chemicals only for their intended purposes.
- Laboratory areas with special or unusual hazards will have posted warning signs. Safety showers, fire extinguishers and special waste containers will be clearly marked.
- All chemical waste will be disposed of according to laboratory waste disposal procedures.
- Broken glassware will be disposed of in appropriately marked waste containers. All used spill cleanup materials will be placed in the proper waste disposal containers.
- Wear eye and face protection when appropriate.
- Always inspect equipment for leaks, tears, and other damage before handling a hazardous chemical.
- Avoid working alone in a lab, especially if the procedures being conducted are hazardous.
- When working with flammable chemicals, be certain that there are no sources of ignition near enough to cause a fire or explosion in the event of vapor release or spill of the chemical.
- No children or unauthorized personnel are allowed in the laboratory or laboratory areas.

B. Laboratory Hygiene (back to top)

The following practices have been established to protect lab employees from health risks associated with the use of hazardous chemicals:

- Avoid direct contact with any hazardous chemical. Know and use the proper protective equipment needed for the task at hand.
- Wash hands with soap and water after handling a chemical and promptly whenever a chemical has contacted the skin.
- No eating, drinking, smoking, chewing gum, or applying cosmetics is allowed in the laboratories or laboratory areas.
- Avoid tasting or sniffing of chemicals.
- Do not pipette or siphon by mouth.
- Confine long hair and loose clothing, jewelry, etc.
- Always wear footwear that completely covers the foot. No sandals, thongs, open toed or open heeled shoes.
- Safety glasses must be worn at all times in the labs. The glasses must be of the impact protection type with splash guards and must meet ANSI Z87.1 specifications. In some cases face shields may be required.
- Wearing contact lenses is discouraged when working with hazardous chemicals; however, if they are worn, employees must recognize the inherent increased risks and safety glasses must also be worn.
- Prescription glasses are not adequate protection in the laboratory. Over-the-glass safety glasses must be worn over them.
- Gloves of material suitable for the chemicals being used must be worn. Consult the SDS or MSDS or SDS for the recommended gloves. Gloves should be checked for tears, rips or deterioration prior to use.

- Wear appropriate laboratory coat or apron if needed while working in the laboratory. Replace it immediately if it becomes contaminated or soiled. Do not wear lab coats outside of the laboratory to prevent contamination of public areas.
- Carefully inspect all protective equipment before using. Do not use defective protective equipment.

C. Laboratory Housekeeping (back to top)

- Bench tops and floors will be kept clear and uncluttered. Materials that are not being used should be put away in their proper storage areas.
- The following will be cleaned after each use: floors, balances and other equipment, bench tops and glassware.
- Chemical waste including all unlabeled containers will be disposed of in the proper waste containers at the end of each lab period.
- Aisles must be kept clear of obstructions.
- Emergency equipment such as safety showers, eyewash stations, and fire extinguishers must always be accessible.
- All spills must be cleaned promptly using appropriate spill cleanup materials and disposed of properly. Follow cleanup and disposal requirements as outlined in the SDS or MSDS or contact the Lab Manager/CHO.
- Keep all aisles, hallways, and stairs clear of all chemicals.
- All secondary containers should be labeled with the name of the chemical and the primary hazard associated with it.
- All chemicals must be stored properly as follows:
    - Flammables in a flammable storage cabinet and away from oxidizers.
    - Corrosives in a corrosive storage cabinet with acid and bases stored apart.
    - Oxidizers stored away from acids and flammables.
    - Poisons stored away from acids and flammables.
    - Compressed gas cylinders stored upright and secured by a chain or strap.
- Whenever exposure by inhalation is likely to exceed the threshold limits described in the SDS or MSDS, a fume hood must be used.

D. Chemical Handling and Storage (back to top)

The following are guidelines for handling and using hazardous chemicals properly:

- Information on proper handling, storage and disposal of hazardous chemicals and access to the related SDS or MSDS must be made available to all laboratory employees prior to the use of the chemical.
- Always purchase the minimum amount necessary to maintain operations.
- Chemical containers with missing or defaced labels or that violate appropriate packing regulations should not be accepted from the vendor.
- Chemicals used in the laboratory must be appropriate for the laboratory's ventilation system.
- Chemicals should not be stored on high shelves and large bottles should be stored no more than two feet above the floor level.
- Chemicals shall be segregated by compatibility.
- Chemical storage areas must be clearly labeled as to their hazard classification.
- Any chemical mixture shall be assumed to be as toxic as its most toxic component.
- Substances of unknown toxicity shall be assumed to be toxic.

E. Transportation of Chemicals (back to top)

When transporting chemicals between laboratories, precautions should be taken to avoid dropping or spilling chemicals.

- Specially designated bottle carriers are available for transporting caustic or acidic chemicals.
- Glass containers must be supported at both the top and bottom of the container. Do not carry a glass bottle by the neck without supporting the base of the container.
- When transporting chemicals on a cart, use a cart that is suitable for the load, resistant to chemicals, and has high edges to contain spills or leaks.

F. Storage and Disposal of Hazardous Waste (back to top)

Detailed guidelines for the storage and disposal of hazardous waste can be found in the CSU Hazardous Waste Manual**.** The following are general guidelines for hazardous waste storage and disposal:

- Waste should be segregated and collected according to its hazard category.
- Waste containers should have tight fitting caps.
- All waste should be properly labeled as hazardous or non-hazardous.
- Caps should be on waste containers at all times except when adding waste to the container.
- Waste bottles should be provided with secondary containment at all times.

3. Standard Laboratory Safe Handling and Storage Requirements

A. Hazard Identification (back to top)

To reduce the risk of misuse of hazardous chemicals by laboratory personnel, new users, and/or visitors, hazardous chemical containers must display the chemical name and hazard identification at a minimum. With respect to identifying hazardous chemicals the following guidelines will apply:

B. Container labeling (back to top)

- Lab personnel must ensure that manufacturer labels on incoming containers of hazardous chemicals have not been removed or defaced.
- All incoming chemicals should be logged into the chemical inventory database.
- Secondary chemical containers which will not be consumed by an experiment immediately must be labeled and include the following information:
    - Full name of chemical constituents (not symbols only)
    - Percentage of chemical constituents (if applicable)
    - Date of preparation
    - Hazardous classification label (flammable, health hazard, etc)
- Anything available over the counter to the general public is exempt from labeling requirements if it is still in the original manufacturer's container.

C. Signage (back to top)

- Lab personnel must ensure that hazardous chemical storage areas are clearly labeled according to their hazard classification.
- Lab pesonnel must also ensure that entrances to the main chemical storage areas are labeled with appropriate warning signs.
- Emergency contact information should also be posted at the entrance of each laboratory where chemicals may be used.

4. Circumstances that Require Approval

A. Hazardous Materials Subject to Review (back to top)

Lab equipment or chemicals which are outside of the scope of this CHP may require prior approval before use from the Lab Manager, CHO, Department Chair, and/or EH&S include the following:

B. Equipment requiring approval (back to top)

- Ethylene oxide sterilizers
- Class 3b or 4 lasers
- Magnets or magnet systems capable of creating a magnetic field ≥5 gauss at a distance of 1 foot or at the operator's position, whichever is less
- Equipment generating sub-radiofrequency (30 kHz and below) magnetic fields which at any time where the magnetic flux density in milliTesla (mT) may be ≥60/frequency (in Hz)
- Equipment which may generate noise at any time in excess of 82 decibels, A weight scale (dBA).

C. Chemicals requiring approval (back to top)

- Explosives including but not limited to TNT and RDX
- Pyrophorics
- Water reactive materials which are not on the lab's chemical inventory
- Extremely toxic solids or liquids which include chemicals with a Lethal Dose 50% by ingestion of 5 mg of material per kg of animal body weight (LD_{50}≤mg/kg)
- Highly toxic gases which include the following:
    - Gases with a Lethal Concentration of 50% by inhalation with an exposure of 200 ppm or less (LC50 ≤200 ppm),
    - Gases which carry a National Fire Protection Association (NFPA) rating of 3 or 4,
    - Gases which carry an NFPA rating of 2 but have poor physiological warning properties (little or no odor or taste at harmful levels) such as carbon monoxide.

5. Provisions for Work with Particularly Hazardous Substances (back to top)

The following guidelines are general procedural guidelines based on the hazard classification of the chemicals being used. Refer to the SDS or MSDS of the particular chemical being used for more specific guidelines.

A. Physical Hazards (back to top)

Materials which present a physical hazard can be safely used if the specific hazard(s) is understood. Personal injury and/or property damage may occur if appropriate precautions are not taken. Additionally, some chemicals cannot be safely stored or mixed with other chemicals due to the potential of a violent reaction or one that generates a toxic gas. See Appendix D for a list of Chemical Incompatibilities.

B. Provisions for Fire Hazards (back to top)

For a fire to occur certain conditions must exist simultaneously as follows: the presence of a flammable gas in the proper concentration, the presence of an oxygen rich environment, and an ignition source. Removal of any one of these conditions will prevent a fire. The following guidelines shall be observed when handling materials that are a fire hazard:

- Eliminate ignition sources such as open flames, sparks, hot surfaces, static electricity, etc.
- Store chemicals in NFPA approved flammable cabinets or containers.
- All procedures using large volumes of flammable liquids (>500 mL) shall be performed in a fume hood.
- Make sure appropriate safety equipment (fire extinguisher, spill kits) is available in the area where the procedure is being performed.
- Ensure that there is proper bonding and grounding when required. (Check bonding and grounding periodically).

C. Provisions for Reactive Hazards (back to top)

The hazard associated with materials classified as reactive is the variable and potentially high rate at which energy may be released under normal conditions, or when struck, vibrated, or agitated. Oxidizers, organic peroxides, explosives, pyrophoric, shock sensitive and water reactive chemicals shall fall under this category and the following general guidelines shall be observed:

- Know the reactivity of the chemical involved in the experiment or procedure.
- Ensure that there are no extraneous materials in the area which could become involved in a reaction.
- If the reaction is anticipated to be violent or explosive, appropriate engineering controls, shields, or other methods for isolating the materials or the process shall be used.
- Gloves such as “electrical linesman’s” type shall be worn when it is unavoidably necessary to reach behind a barrier or shield during a procedure.
- Tongs or other handling devices should be used when working with these types of materials to keep them at a safe distance.
- Lab coats and impact-resistant safety goggles with splash guards should be worn at all times.
- A face shield providing throat protection shall be worn at all times when a worker is in an exposed position, such as when shields are moved aside, when handling, transporting or manipulating equipment.
- Pyrophoric chemicals should be used and stored in inert environments.
- Some chemicals become increasingly shock-sensitive as they age. Contact the Lab Manager/CHO when it is suspected that the formation of shock sensitive materials has occurred.

- Do not open any peroxide forming chemical which has an obvious solid crusting around the lid.
- Addition of an appropriate inhibitor to quench the formation of peroxides is recommended.
- Store light sensitive chemicals in a cool dark place in amber colored bottles or containers which reduce and/or eliminate the penetration of light.
- Follow the same basic handling procedures as for flammable materials.

D. Provisions for Compressed Gas Hazards (back to top)

Special systems are needed for handling materials under pressure. Cylinders pose mechanical, physical, and/or health hazards, depending on the compressed gas in the cylinder.

- Cylinders with regulators must be individually secured. Only cylinders with valve protection caps securely in place may be safely gang chained or stored unchained in a cylinder cage.
- All gas cylinders must have the protective cap securely in place during transporting, storage and when not in use.
- Empty cylinders must be labeled as such and stored securely.
- Cylinders must be secured or stored in an upright position at all times.
- Cylinders should be segregated according to their hazardous class while in storage.
- Never bleed a cylinder completely empty. Leave slight pressure to keep contaminants out.
- Use only an oxygen approved regulator for oxygen cylinders. Do not lubricate an oxygen regulator because oil or grease on the high pressure side of an oxygen regulator can cause an explosion.
- Always wear goggles or safety glasses with side shields when handling compressed gases.
- Always use appropriate regulators, fittings, and materials compatible with the particular gas being handled.
- Contact the Lab Manager/CHO for proper handling requirements before working with a toxic, corrosive, or reactive gas.

E. Provisions for Cryogen Hazards (back to top)

Liquefied gases that condense oxygen from the air will create an oxygen rich atmosphere and can increase the potential for fire if flammable/combustible materials and a source of ignition are present. Pressure is also a hazard due to the large expansion ratio from liquid to gas, causing pressure to build up in containers. Many materials become brittle at extremely low temperatures and can cause burns similar to burns caused by heat. Some of the hazards associated with cryogens are fire, pressure, weakening of materials, and skin or eye burns upon contact with these chemicals. The following guidelines shall be observed when handling cryogen hazards:

- Equipment should be kept clean, especially when working with liquid or gaseous oxygen.
- Mixtures of gases or fluids should be strictly controlled to prevent the formation of flammable or explosive mixtures.
- Always wear goggles or safety glasses with side shields when handling cryogens.
- If there is a chance of a splash or spray, a full face protection shield is required.
- An impervious apron or coat, cuff less trousers, and high topped shoes shall be worn.

- Gloves shall be impervious and sufficiently large enough to be readily thrown off in case of a cryogen spill. Pot holders could also be used.
- Watches, rings or other jewelry should not be worn.
- Containers and systems containing cryogens should have pressure relief valves.
- Containers and systems should also be capable of withstanding extreme cold without becoming brittle.
- Cryogenic storage vials should be used rather than glass vials or ampoules.

F. Provisions for Corrosive Hazards (back to top)

Materials which can react with the skin, eyes, and mucosa to cause burns similar to thermal burns, and/or which can react with metals to cause deterioration of these surfaces are considered corrosives. This category shall include acids, bases and other corrosives. The following guidelines shall be observed when handling corrosive hazards:

- Always wear goggles or safety glasses with side shields when handling corrosives.
- Rubber or chemical resistant gloves must be worn to prevent skin contact.
- A face shield, rubber apron, and rubber boots may also be appropriate when handling corrosive materials, depending on the work being performed.
- Containers and equipment used for processing of corrosives materials should be corrosion resistant.
- Never add water to acid. Pour the acid slowly into the water when diluting concentrated acids.
- Work in a fume hood when handling concentrated corrosives to prevent vapor burns of mucus membranes.
- An eyewash and safety shower must be readily accessible where corrosives are used and stored.
- In the event of exposure with corrosives, contaminated clothing must be removed and the area(s) flushed with water for a minimum of 15 minutes.

G. Provisions for Health Hazards (back to top)

To ensure that employee exposure to toxic chemicals do not exceed the PEL or TLV, the following precautions shall be taken:

- Employees must review the SDS or MSDS and be aware of the hazards the chemical poses before using the chemical.
- All procedures involving toxic materials shall be conducted in an operating fume hood.
- PPE shall be used in accordance with the recommendations given in the SDS or MSDS.
- Immediately after working with toxic chemicals, employees shall wash their hands and arms.

H. Provisions for Particularly Hazardous Substances (back to top)

Special precautions should be taken when handling particularly hazardous materials in order to ensure employee health and safety. The following hygiene standards should be observed when using the following substances:

- Establish a designated area.
- Use and store these materials only in designated areas.
- The designated area should have restricted access and use of the space.

- The Lab Manager/CHO or PI must assure that all personnel with access be aware of the necessary safety precautions.
- Label all containers, storage and use areas appropriately.
- Use appropriate containment devices for the hazardous chemical.
- Use HEPA filters or high efficiency scrubber systems to protect vacuum lines and pumps.
- Wear long sleeved disposable clothing and gloves known to resist permeation by the chemicals to be used when working in designated areas.

6. Emergency/Medical Attention and Surveillance (back to top)

A. Basic Steps for Emergency and Spill Response (back to top)

The release of hazardous substances that pose a significant threat to health and safety, or that by their very nature require an emergency response regardless of the circumstances surrounding their release, are emergency situations. For CSU's purposes, the following definitions designate an emergency situation:

- The situation is unclear to the person discovering or causing the spill.
- The release requires evacuation of persons.
- The release involves or poses a threat of fire, explosion, a condition of immediate danger to life and health, high levels of exposure to toxic substances and/or other imminent danger.
- The person(s) in the work area are uncertain if they can handle the severity of the hazard with the PPE and response equipment that has been provided and/or the exposure limit could easily be exceeded.

Conversely, releases that do not pose a significant threat to health and safety or that do not have the potential to become emergencies in a short period are not considered as emergency situations. The following situations ARE NOT emergency situations:

- The person(s) discovering or causing the release understands the properties and can make an informed decision as to the exposure level.
- The release can be appropriately cleaned up by lab personnel using authorized spill kit.
- The materials are limited in quantity, exposure potential or toxicity and present minor health or safety hazards.
- Incidental releases of hazardous substances that are routinely cleaned up by lab personnel or trained faculty are not considered an emergency.

B. Emergency Situation – Fire (back to top)

The following steps shall be basic protocol for handling a fire or fire-related situation in the laboratory:

- Pull the fire alarm.
- Call Public Safety at 678-466-4050 (ext. 4050 on campus) from a safe location.
- Notify the Lab Manager/CHO.
- Evacuate the area.

C. Emergency Situation – Chemical Spill (back to top)

The following steps shall be basic protocol for handling a chemical spill:

If you are unsure how to proceed, if the chemical is of high toxicity or flammability, or more than 1 liter is spilled, then execute the following:

- Notify the Lab Manager/CHO.
- Evacuate personnel from the spill area and notify adjoining labs.
- Isolate the spill area.
- Remove ignition sources and shut down equipment.
- Establish exhaust ventilation to the outside of the building, if possible (open windows, etc).
- Call Public Safety at 770-466-4050 (ext. 4050 on campus) from a safe location.

Evacuation of the building is mandatory if chemicals or contaminants could enter the air circulation system of the building.

D. Emergency Situation – Body Splash (back to top)

- Remove contaminated clothing while leading victim to an emergency shower.
- Flood affected skin area with water for at least 15 minutes; longer if pain persists.
- Wash skin with soap and water only.
- Contact emergency response personnel and assure that they know the name of the chemical(s) involved.

E. Emergency Situation – Eye Splash (back to top)

- Lead the victim immediately to an emergency eyewash station.
- Hold eye lids open.
- Flush eyes with water for 15 minutes or longer if pain persists.
- Contact emergency response personnel and assure that they know the name of the chemical(s) involved.

F. Emergency Situation – Other Spills – Mercury (back to top)

For very small spills, (e.g. broken thermometers) use a mercury emergency spill kit or a trapped vacuum line attached to a trapped tapered glass tube, similar to a medicine dropper, to pick up the mercury droplets.

- Do not use a domestic or commercial vacuum cleaner.
- Cover small droplets in accessible areas with one of the following:
    - Sodium Ash
    - Powered Sulfur
    - Silver Metal Compounds
    - Dry ice to freeze mercury droplets
- Place spill residue in a proper container for hazardous waste pickup.

Note: For large spills, contact the Lab Manager/CHO for spill cleanup, instructions or assistance.

G. Spill Kits (back to top)

Ready access to a chemical spill kit is required in laboratories working with hazardous chemicals. Each employee should be trained in how to use the kit. Minimally, the kit should contain the following:

- Resistant splash goggles,
- Chemical resistant gloves,
- Plastic bags and scoop,
- Multi-chemical adsorbent (enough for a 2 gallon spill).

H. Non-Emergency Situation – Spill (back to top)

If the spill is less than 1 liter and the chemical involved is of low toxicity and low flammable hazard, the material should be handled in the following manner:

- Locate the spill.
- Contain or confine the spill.
- Wear gloves, apron, coveralls and protective eye wear.
- Wear boots if needed.
- Use a fitted respirator if there is an inhalation exposure above the PEL.

I. Non-Reactive Spills (back to top)

If the spill is non-reactive, handle in the following manner:

- Cover liquid spill with spill kit absorbent, scoop into plastic bag for disposal.
- Sweep solid materials into dust pan and place in a sealed container.
- Dispose of the container in the normal trash as long as the material is non-hazardous and non-volatile.

J. Reactive or Potentially Reactive Spills (back to top)

If the spill is reactive or has the potential to be reactive, handle it in the following manner:

- Cover liquid spills with spill kit absorbent and scoop into appropriate disposal container for hazardous waste disposal.
- Wet mop dry substances to avoid spreading hazardous dust, provided it is not water reactive. Dispose of it as hazardous waste.
- Follow the CSU Hazardous Waste Manual for proper disposal of hazardous waste.

K. Power Outages (back to top)

If Emergency lighting and fire alarms ARE NOT operable, evacuate the building after carrying out the following procedures:

- Make sure the lids are on all open containers.
- Lower the sash on chemical fume hoods.
- Shut down all equipment (leave cooling water and purge gases on as necessary).
- Turn off all ignition sources.
- Secure or isolate reactions that are underway (boiling liquids on a hot plate, distillations, etc.).
- Close fire doors.
- Take your personal belongings with you.
- Lock outside door to the lab.

Note: In anticipation of possible power outages, have a flash light or other lighting source conveniently located. Make sure that the emergency contact information is current.

L. Injury and Illness (back to top)

If an employee believes he/she has had a chemical exposure, he/she should first report the exposure incident to a faculty member or Lab Manager/CHO. The Lab Manager/CHO will complete an accident/incident form and report the exposure incident to the CHO. A Workers Compensation Claim must be filed with Human Resources. A copy of the Supervisor's Accident/Incident Report Form is in Appendix C.

Medical Examination and consultation will be provided following the Department of Administrative Services Workers Compensation rules under the following conditions:

- When an employee develops signs and symptoms associated with a hazardous chemical in use.
- After a major spill or leak or other release when an overexposure could have occurred.
- If determined through monitoring that an exposure has occurred.

A consultation shall be provided to determine the need for a medical examination. The consultation and examination shall be performed by or under the supervision of a licensed physician experienced in treating chemical exposures. It shall be provided at no cost to the employee, without loss of pay and at a reasonable time and place.

CSU shall provide any information required by the physician necessary to treat the employee. The physician will provide a written opinion to CSU. This will be treated as Workers Compensation Claim. If a Workers Compensation Claim must be filed, the CSU Personnel Department shall be notified and will maintain all the paperwork and medical records.

M. Minor First Aid (back to top)

First aid kits should be available in the laboratories and stocked with essential supplies. Essential supplies should include at minimum various sizes of adhesive bandages, gauze, sterile pads, forceps, scissors, tape, antiseptic wipes and a cold pack. The following guidelines should be followed when administering minor first aid:

- Do not dispense or administer any medications, including aspirin.
- Do not apply any ointments or creams to burns or wounds. Use cool water.
- Consult the SDS or MSDS for chemical specific first aid information.

7. Standard Laboratory Facility Requirements (back to top)

A. Signs and Information (back to top)

Labels and warning signs should alert employees to potentially hazardous materials and allow those unfamiliar with the laboratory to identify hazardous chemical use and storage areas, safety facilities, emergency equipment, exits and also aid emergency response personnel.

B. Safety Data Sheets (SDS) or Material Safety Data Sheet (MSDS) (back to top)

An MSDS or SDS is a document containing chemical hazard identification and safe handling information and is prepared in accordance with the OSHA Hazard Communication Standard. Chemical manufacturers and distributors must provide the purchasers of hazardous chemicals an appropriate MSDS or SDS for each hazardous chemical or product purchased. Under new OSHA rules, MSDSs are being replaced by SDSs.

The Georgia Legislature passed the "Public Employee Hazardous Chemical Protection and Right to Know Act of 1988" (O.C.G.A Title 45 Chapter 22-2) for the control of unsafe use of hazardous chemicals in the workplace. Because of this law and because the Board of Regents recognizes the need to address employee safety, SDSs or MSDSs shall be made available to all employees. An SDS or MSDS is available for each chemical or product used at CSU in paper copy located in the appropriate CSU labs or online from the manufacturer, supplier, or other internet sources. The SDS or MSDS give the guidelines used to determine the safety precautions, PPE, and engineering controls necessary to protect employees from exposure. Each lab using hazardous chemicals shall provide easy access to SDSs or MSDSs for hazardous chemicals used in the lab.

Laboratory Safety Inspections will be done routinely, at least once a semester, the CHO. A copy of the Laboratory Safety Inspection Checklist can be found in Appendix E.

C. Generic Signs (back to top)

Every laboratory storing and/or working with hazardous or potentially hazardous chemicals shall have the following signs visibly posted:

- Emergency contact numbers consisting of a primary and an alternate emergency contact. These names and numbers shall be updated when personnel change. The emergency contact should be posted both inside and outside the lab door.
- If a lab has 10 gallons or more of a flammable liquid, then the main doorway to the lab must have a flammable liquid sticker/decal visibly posted on it. This is an aid to fire response personnel.

D. Restricted Access and Designated Areas (back to top)

Laboratories containing especially dangerous hazards must have warning signs posted at the entrance to the lab and also at the designated area in the lab where the hazard exists.

E. Storage Areas (back to top)

Chemicals shall be stored according to compatibility as designated by their hazard class. Particularly hazardous chemicals should be stored and handled with extreme care. When ordering unfamiliar chemicals, review the SDS or MSDS before purchasing so that use and storage guidelines are understood.

F. Control Measures (back to top)

The Lab Manager/CHO and/or PI must implement control measures to reduce employee exposure to hazardous chemicals. The three types of control measures are as follows:

- Administrative Controls: These methods reduce employee exposure to contaminants by job rotation, work assignment or time periods away from contaminant. Examples of administrative controls include SOPs, CHPs and Safety Manuals.

- Engineering Controls: These methods control exposure by modifying the source or reducing the quantity of contaminants released into the work environment. Examples of engineering controls include fume hoods and biosafety cabinets.
- Personal Protective Equipment (PPE): Personal safety equipment provides secondary protection from hazardous chemicals. Examples of PPE include gloves, safety glasses and lab coats.

Control measures are required when the following circumstances are met:

- Whenever hazardous chemicals are used.
- Whenever exposures exceed the PEL or the TVL.
- Upon addition of new chemicals or changes in procedures.

Other situations should be dealt with on a case by case basis. Consult Lab Manager/CHO for assistance in establishing control measures.

The following general control measures are recommended for use in most situations when using hazardous chemicals. Use the following primary methods for detecting exposure:

- Determine the source of exposure.
- Determine the path the contaminant follows to reach the employee.
- Determine the employee's work habits and use of PPE.
- Change one or more of the above pathways to reduce or eliminate exposure.
- Substitute less harmful chemicals for more harmful chemicals and when possible.
- Change or alter processes to minimize exposure.
- Isolate or enclose a process or work operation to reduce the number of employees exposed. (Use a fume hood).
- Use wet methods to reduce the generation of dust.
- Use local exhaust ventilation (hoods) at the point of generation or dispersion of contaminants, and use dilution (general) ventilation to reduce air contaminants.
- Practice good housekeeping procedures to reduce unnecessary exposures.
- Use training and education as primary administrative controls for reducing exposure.
- Use special control methods such as shielding and continuous monitoring devices to control exposures in special situations.

G. Personal Protective and Safety Equipment (back to top)

Maintaining a safe laboratory environment is the responsibility of the Lab Manager/CHO, Lab Technicians, and PI, but all employees play a role in observing safety guidelines. Personal protective devices and safety equipment must be provided to all employees under the appropriate circumstances and employees have the responsibility of properly using this equipment.

The SDS or MSDS will provide information on the PPE and safety procedures recommended for a given chemical, but it may not provide sufficient information as to the specific type of safety equipment required (for example, it might say use gloves but not specify which type to use). Employees unsure of the appropriate PPE to use should consult with the Lab Manager/CHO.

H. Eye and Face Protection: General Guidelines (back to top)

Eye protection must be made available to all employees or visitors where chemicals are used and/or stored. Protective eye and face equipment must be used when there is a reasonable

probability that injury from the use of hazardous chemicals can be prevented. The minimum acceptable requirements are for hardened glass or plastic safety spectacles.

Note: The Lab Manager/CHO and/or PI should establish the level of eye protection needed per laboratory activity based on the guidelines below:

- All eye protective equipment must be stamped with Z87 by the manufacturer to meet ANSI standards.
- Safety goggles (impact goggles) are the appropriate type for protection against flying particles.
- Chemical splash goggles should be used when there is a chance of a splash.
- Face shields protect the face and neck from flying particles and splashes.
- Additional eye protection should be worn under the face shield.
- Ultraviolet light face shields should be worn when working over UV light sources.

I. Safety Glasses (back to top)

Safety glasses are required when any of the following exists:

- When an impact hazard exists.
- When working with low hazard chemicals.
- When a low probability of a splash exists.
  Examples:
  Pipetting.
  Handling closed bottles of injurious chemicals.
  Mixing solutions.
  Opening centrifuge tubes.

J. Chemical Splash Goggles (back to top)

Chemical splash goggles are required when any of the following exists:

- When working with smaller amounts of corrosive or injurious chemicals.
- When a reasonable probability of splash exists
- Examples:
  - Pouring acid out of a 1 pint bottle.
  - Pouring methylene chloride out of a 1 liter bottle.
  - Working with liquids under pressure.

Fume hood use and/or face shield and chemical safety goggles are required when any of the following exists:

- When working with large amounts of corrosive chemicals.
- When there is a high probability of eye and face injury.

- Examples:
  - Working with an acid bath.
  - Pouring 4 liters of acid into a container.
  - Handling highly reactive chemicals that may splatter.

Note: ordinary prescription glasses do not provide adequate protection against eye injury. Over-the-glass safety glasses with side shields are required.

K. Skin and Body Protection (back to top)

Skin and body protection involves the use of protective clothing to protect from exposure. The most basic and effective forms of protection are gloves and lab coats. The following guidelines will be followed to protect against skin and body exposure:

- Protect exposed skin surfaces when there is a reasonable anticipation of a splash.
- Lab coats, coveralls, aprons, or protective suits will be worn if there is a minimal risk of skin exposure to an extremely hazardous substance. These protective garments should not leave the laboratory.
- Impervious protective equipment must be used to prevent skin contamination when working with strong acids, and acid gases, organic chemicals and strong oxidizing agents.

L. Respirators (back to top)

Respirators are not currently available for use by CSU laboratory employees. Therefore, no operations will be permitted in CSU labs that could result exposures above the limits that the available engineering controls are designed to achieve.

M. Safety Showers (back to top)

Safety showers provide an immediate water drench of an affected person. CSU complies with the BOR guidelines for location, design, and maintenance of safety showers as follows:

- Safety showers are located within a 10 second walking time of lab hazard areas.
- Safety showers are located at least 4 feet from walls (preferably near a sink).
- Safety showers are located at least 6 feet from electrical sources.
- Safety shower heads are installed 4 inches below the ceiling.
- Safety shower valve rods or handles are within easy reach of deluge area.
- Safety showers have an identified in-line shut-off valve (usually above ceiling).
- Safety shower water flow is at least 20 gpm**.**
- Safety shower water flow stops dripping within 1 minute of shut-off.
- Safety shower signage is installed, visible from any direction.
- All safety showers should be flushed clean at least annually.
- Safety showers should be tagged for continuous proof of servicing.

N. Eyewash Stations (back to top)

Eyewash stations at CSU also comply with BOR guidelines for location, design and maintenance as follows:

- Eyewashes are plumbed into the cold water line at or near a major sink.
- Eyewashes have twin-stream nozzles, properly anchored to maintain position.
- Eyewash nozzle filters are not installed until water supply lines are flushed out.
- Eyewash water flow is at least 3 gpm.
- Eyewash water pressure is gentle (adjusted to criteria guideline).
- Eyewash water stream is not blocked by cabinetry or other equipment.
- Eyewash valve handle remains on when activated.

- Eyewash signage is installed, visible from any direction.
- Eyewash units should be checked annually for proper valve operation, nozzle restrictions, filters condition and pressure adjustment.
- Departments should flush eyewash units weekly to maintain a clean line.
- Eyewash units should be tagged for continuous proof of service.

O. Ventilation Controls (back to top)

Ventilation controls are those controls intended to minimize employee exposure to hazardous chemicals by removing air contaminants from the workplace. There are two main types of ventilation controls as follows:

- General (Dilution) Exhaust: this type brings in air from outside and ventilates within. General exhaust is not recommended for the use of most hazardous chemicals.
- Local Exhaust: A ventilated, enclosed work space intended to capture, contain and exhaust harmful or dangerous fumes, vapors and/or particulate matter.

Laboratory size and layout clearances shall be coordinated with HVAC design and fume hood placement to avoid creating turbulent air near fume hoods or biological safety cabinets, and dead air pockets or reverse air currents along the hood opening. Hoods should be located away from aisles, doors, and air supply vents.

P. Fume Hoods (back to top)

Fume hoods should receive annual certification to assure they are performing properly. If airflow is found below the acceptable range (80-120 fpm with sash open at 18 inches), hoods should be removed from service until required airflow is re-established. Other problems noted should be reported for correction when discovered.

Q. Hood Use (back to top)

When using a fume hood, the following procedures shall be employed:

- Work surfaces shall be kept clean and clear when hood is not in use. All objects inside of hood shall be kept at least 6 inches behind the sash.
- Large equipment used in a hood shall be raised an inch or more off the hood base to allow airflow under it.
- Spills and residues within a hood shall be cleaned up promptly.
- Never work with hazardous chemicals if the required ventilation system is not working.

R. Hood Storage (back to top)

Hood storage procedures are as follows:

- Fume hoods shall not be used primarily for the storage of chemicals or for evaporating chemicals from containers.
- Contents within a hood should not block rear openings at any level. Baffles should not be completely closed off.

Appendices (back to top)

A. Appendix A – List of Acronyms (back to top)

ANSI	American National Standards Institute
BOR	Board of Regents
BSC	Biosafety Cabinet
CHO	Chemical Hygiene Officer
CHP	Chemical Hygiene Plan
EH&S	Environmental Health & Safety
GDOL	Georgia Department of Labor
GPM	gallons per minute
CSU	Clayton State University
CSU-CHP	Clayton State University - Chemical Hygiene Plan
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
O.C.G.A.	Official Code of Georgia Annotated
PEL	Permissible Exposure Limit
PI	Principle Investigator
PPE	Personal Protective Equipment
RTK	Right to Know
RTK-CS	Right to Know – Chemical Specific
SOP	Standard Operating Procedure
TLV	Threshold limit value

B. Appendix B – Supervisor's Accident / Incident Report Form (back to top)

Supervisor's Accident / Injury Report Form

This form is to be filled out by the Immediate Supervisor of the injured.

Name of Supervisor: _____

Email address:

Personal Information					
☐	Student	☐	Employee		
Full Name:					
Department:					
Phone Number/Ext.:					
Email Address:					
Building Information					
Building Name:					
Room Number:					
Incident Information					
Date of accident/injury:		Time of accident/injury:			
Type of accident/injury (please choose all that apply)					
☐	Strain or sprain	☐	Fracture	☐	Wound
☐	Skin	☐	Foreign body	☐	Amputation
☐	Chemical Exposure	☐	Slip/trip/fall	☐	Puncture
☐	Cut/Laceration	☐	Assault	☐	Contusion
Other (please list):					
Body part affected (please choose all that apply)					
☐	Eyes	☐	Head	☐	Face and Neck
☐	Feet	☐	Legs	☐	Finger
☐	Arms	☐	Hands	☐	Upper Back
☐	Lower Back	☐	Chest (Respiration)	☐	Trunk/internal organs
Other (please list):					
Name(s) of witness(es):					
How did the accident/injury occur?					
Please state how the injury/illness occurred. Include equipment, materials or chemicals in use when the accident/injury occurred.					
What caused the accident/injury?					
Please state why the event occurred including conditions that contributed to the accident/injury, such as: slippery surface, chemical reaction, failure to use safety equipment, etc.					

Supervisor's signature	Date	Phone number

(back to top)

C. Appendix C - Chemical Incompatibilities (back to top)

When certain hazardous chemicals are stored or mixed together, violent reactions can occur because the chemicals are unsuitable for mixing or are incompatible to each other. Classes of incompatible chemicals should be segregated from each other during storage. Use the following general guidelines for hazard class storage:

- Flammable/Combustible Liquids and Organic Acids
- Flammable Solids
- Mineral Acids
- Caustics
- Oxidizers
- Perchloric Acid
- Compressed Gases

Before mixing any chemicals, refer to this partial list, the chemicals' SDSs or MSDSs or call the Lab Manager/CHO to verify compatibility:

Chemical	**Incompatible Chemicals**
A	
Acetic acid	aldehydes, bases, carbonate, hydroxides, metals, oxidizers, peroxides, phosphates, xylenes
Acetylene	halogens, mercury, potassium, oxidizers, silver
Acetone	acids, amines, oxidizers, plastics
Alkali and alkaline	acids, chromium, ethylene, halogens, hydrogen, mercury, earth metals, nitrogen, oxides, plastics, sodium chloride, sulfur
Ammonia	acids, aldehydes, amides, halogens, heavy metals, oxidizers, plastics, sulfur
Ammonium	Acids. alkalis, chloride salts, combustible materials, metals, nitrate, organic materials, phosphorus, reducing agents, urea
Aniline	acids, aluminum, dibenzoyl peroxide, oxidizers, plastics
Azides	acids, heavy metals, plastics
B	
Bromine	acetylaldehydes, alcohols, alkalis, amines, combustible materials, ethylene, fluorine, hydrogen, ketones, metals, sulfur
C	
Calcium oxide	acids, ethanol, fluorine, organic metals
Carbon (activated)	alkali metals, calcium hypochlorite, halogens, oxidizers
Carbon tetratetrachloride	Benzoyl peroxide, ethylene, fluorine, metals, oxygen, plastics, silanes

Chlorates	Powdered metals, sulfur, finely divided organic or combustibles
Chromic acid	Acetone, alcohols, alkalis, ammonia, bases
Chromiumtrioxide	Benzene, combustible materials, hydrocarbons, metals, organic materials, phosphorus, plastics
Chlorine	Alcohols, ammonia, benzene, combustible materials, flammable compounds (hydrazine), hydrocarbons, (acetylene, ethylene, etc.), hydrogen peroxide, iodine, metals, nitrogen, oxygen, sodium hydroxide
Chlorine dioxide	hydrogen, mercury, organic materials, phosphorus, potassium hydroxide, sulfur
Copper	Calcium, hydrocarbons, oxidizers
Cyanides	acids, alkaloids, aluminum, iodine, oxidizers, strong bases
F	
Flammable liquids	Ammonium nitrate, chromic acid, hydrogen peroxide, halogens, nitric acid, sodium peroxide
Flourine	Alcohols, aldehydes, ammonia, combustible materials, hydrocarbons, ketones, metals, organic acids
H	
Hydrofluoric acid	Metals, organic materials, plastics, silica
Hydrogen peroxide	Acetylaldehyde, acetic acid, acetone, alcohols, aniline, carboxylic acid, combustible materials, metals, nitric acid, organic compounds, phosphorus, sulfuric acid, sodium
Hydrogen sulfide	Acetylaldehyde, metals, oxidizers, sodium
Hypochlorites	Acids, activated charcoal
Hydrocarbons	Acids, bases, oxidizers, plastics (butane, benzene, propane, turpentine, etc)
I	
Iodine	Acetylaldehyde, acetylene, ammonia, metals, sodium
M	
Mercury	Acetylene, aluminum, amines, ammonia, calcium, fulminic acid, lithium, oxidizers, sodium
N	
Nitrates	Acids, metals, nitrites, sulfur, sulfuric acid
O	
Oxalic acid	Oxidizers, silver, sodium chlorite
Oxygen	Acetaldehyde, secondary alcohols, alkalis, alkalines, ammonia, carbon monoxide,

	combustible materials, ethers, flammable materials, hydrocarbons, metals, phosphorus, polymers
P	
Perchloric acid	Acetic acid, alcohols, aniline, combustible materials, dehydrating agents, ethyl benzene, hydrochloric acid, hydriotic acid, iodides, ketones, organic materials, oxidizers, pyridine
Peroxides (organic)	Acids
Phosphorus (white)	Oxygen
Potassium	Acetylene, acids, alcohols, halogens, hydrazine, mercury, oxidizers, selenium, sulfur
Potassium chlorate	Acids, ammonium, combustible materials, fluorine, hydrocarbons, metals, organic materials, sugars
Potassium	(see chlorates incompatibility), hydrazine, reducing agents, perchlorate, sulfuric acid
Potassium	Benzaldehyde, ethylene glycol, glycerol, sulfuric acid, permanganate
S	
Silver	Acetylene, ammonia, oxidizers, ozonides, peroxyformic acid
Sodium	Acids, hydrazine, metals, oxidizers, water
Sodium nitrate	Acetic anhydride, acids, metals, organic matter, peroxyformic acid, reducing agents
Sodium peroxide	Acetic acid, benzene, hydrogen sulfide metals, oxidizers, peroxyformic acid, phosphorus, reducing agents, sugars, water
Sulfides	acids
Sulfuric acid	Potassium chlorate, potassium perchlorate, potassium permanganate
References: SDS or MSDS of various chemical companies, Michigan State University (Office of Radiation, Chemical and Biological Safety)	

D. Appendix D – Laboratory Safety Inspection Checklist (back to top)

Clayton State University
Laboratory Safety Inspection Form

Date: _____ Inspected by: _____

Location:
_____

	Criteria *(please check yes, no, or N/A to each item)*	Yes	No	N/A
	Chemical Storage			
1	Are all empty containers removed from the chemical storage shelves?			
2	Are the shelves clear of obstruction?			
3	Are the chemical containers securely closed (spot check this by noting obvious problems and randomly checking at least 5 containers)?			
4	Are all containers free from obvious signs of corrosion, leakage, spillage or residue?			
5	Are all chemicals in secondary containers properly labeled? (Chemical name, concentration, owner's name, date)			
6	Are there NFPA diamond labels on all secondary containers?			
7	Are labels on secondary containers readable?			
8	Are incompatible chemicals separated?			
9	Are ALL the MSDS folders located in an easily accessible place at a reasonable distance from the chemicals (i.e. can be obtained in less than 1 minute)?			
10	Are chemical inventory sheets located adjacent to the storage shelves?			
	Cleanliness and stock			
11	Are the shelves and cabinets and other surfaces in the lab relatively clean and free of dust?			
12	Are paper towels and soap dispensers stocked?			
13	Is all glassware clean and stored in its proper location?			
14	Are all glassware removed from rolling carts? Any glassware found on rolling carts should be moved immediately to proper location.			
15	Are equipment, models, and supplies stored in their proper location?			
16	Are floors and counters clean and dry? Any spills (water, solid or chemical) visible on floors or counters should be cleaned up immediately.			
17	Are unautoclaved biohazardous wastes immediately removed from countertops or carts?			
18	Is the lab clear of obstructions for easy evacuation?			
19	Are the showers and eyewashes easily accessible?			
20	Are chemical fume hoods clean and is the hood surface empty (if applicable)?			
21	Are the gas cylinders stored properly (chained or in a case with a regulator or screw cap secured)?			

	Labels and Signs			
22	Are eyewashes, showers and first aid kits labeled?			
23	Are emergency exits labeled?			
24	Are laboratory doors labeled with the NFPA diamond explaining what chemical dangers may exist in the laboratory?			
25	Are laboratory doors labeled with the Biohazardous symbol if the lab contains biohazardous materials (NBS 120 and biology prep room)?			
26	Are laboratory doors labeled with emergency phone numbers?			
27	Are cold storage units (freezers and refrigerators) labeled with proper NFPA labels or Biohazardous symbols, where applicable?			
28	Is all signage legible (emergency exits, fire extinguishers, showers, eye wash stations, etc.)?			
	Safety Equipment			
29	Is the first aid kit present and stocked?			
30	Do the safety showers and eyewashes appear to work (check last inspection date)?			
31	Please indicate the date the fire extinguisher was last inspected _____.			
	Is a working fire extinguisher present in the lab? Is it fully charged?			
32	Is the lab equipped with chemical spill kits (if necessary) and are there ample supplies in the kit? Note: the following labs do not need spill kits, NBS 122, NBS 138.			
33	Are notification procedures for handling spills and emergencies posted?			
34	Are the broken glass or sharps containers empty or partially filled (with space for more)?			
35	Are all sharps or biohazardous items in the proper waste receptacles? (Note: Look for the obvious and please don't dig around in a container as it would be too dangerous. Sharp items should be in Sharps container and biohazardous waste should be in a Biohazard waste container).			
	Other items			
36	Are the external lab doors locked?			
37	Do the cold storage items appear to be working?			
38	Is the temperature appropriate in the lab?			
39	Is everything free from leakage (HVAC system, freezers, refrigerators, water purifiers, stills, water containers, etc.)?			

Describe conditions for all "no" answers:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Describe corrective actions taken for all “no” answers above and date action was taken (corrective actions should be taken within 1 week of inspection:

No Answer noted	Corrective Action taken	Date taken